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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/528,137	12/12/2005	Takashi Ozaki	050161	2307
23850 7590 03/31/2009 KRATZ, QUINTOS & HANSON, LLP 1420 K Street, N.W. Suite 400 WASHINGTON, DC 20005				
EXAMINER MACARTHUR, SYLVIA				
ART UNIT		PAPER NUMBER		
1792				
MAIL DATE		DELIVERY MODE		
03/31/2009		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/528,137

**Applicant(s)**

OZAKI ET AL.

**Examiner**

Sylvia R. MacArthur

**Art Unit**

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 March 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) 9-17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 3/17/2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)
- Paper No(s)/Mail Date \_\_\_\_\_

- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/12/2009 has been entered.

### ***Response to Arguments***

2. Applicant's arguments with respect to claims 1-8 and 18 have been considered but are moot in view of the new ground(s) of rejection. Applicant's amendment of claim 1 that the feed opening for supplying a first gas that is inert to the seal cap and the second gas is more active to the seal cap than the first gas necessitated the introduction of the prior art of Yamamoto (US 6,187,102) and further necessitated a modified interpretation of the prior art of Fujita et al (US 6,238,488) and its use as a basis for a rejection. Applicant's arguments regarding the prior art of Kogano et al (US 2002/0094502) were found persuasive in that the purge gas exhaust does not allow the gas to be interpreted as the first gas as it does not enter the furnace, see page 10, paragraphs 2 and 3.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-8 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujita et al (US 6,238,488).

The prior art of Fujita et al teaches a method and apparatus of cleaning film forming apparatus. The apparatus features seal cap 28 and a cover 18 that form a small chamber as illustrated in Fig.1. Feed lined 36 and 38 correspond to the feed openings wherein 38 comprises the recited flow outlet. It is noted that the inert gas (nitrogen) supplies line 36 and the treatment fluid line 38, however, and apparatus it was it is and not what it does such that the structure of Fujita et al is inherently capable of switching the source of gases to meet the claim limitations. The type of gas supplied does not further limit the structure of Fujita et al.

Regarding claim 2: The substrate processing apparatus according to claim 1, wherein the small chamber is formed by the seal cap and the cover and the inner wall surface of the reaction furnace; and the flow outlet is formed by a clearance between the cover and the inner wall surface of the reaction furnace see Figures.

Regarding claim 3: The substrate processing apparatus according to claim 2, wherein the reaction furnace includes a process tube, and a furnace opening flange for supporting the process tube; and the small chamber is formed by the seal cap and the cover and the inner wall surface of the furnace opening flange; and the flow outlet is formed by a clearance between the inner wall surface of the furnace opening flange and the cover, see Figure 1.

Regarding claim 4: The substrate processing apparatus according to claim 3, wherein the furnace opening flange includes an inlet flange for supporting the process tube, and a base flange for supporting the inlet flange; and the small chamber is formed by the inner wall surface of the base flange and the cover and the seal cap; and the flow outlet is formed by a clearance between the inner wall surface of the base flange and the cover, see Figure 1.

Regarding claim 5: The substrate processing apparatus according to claim 4, wherein the feed opening for supplying the first gas is provided in the base flange; and the feed opening for supplying the second gas is provided in the inlet flange, see Figure 1.

Regarding claim 6: The substrate processing apparatus according to claim 1, wherein the cover is formed by a plate-shaped member, see Figure 1.

Regarding claim 7: The substrate processing apparatus according to claim 1, comprising a boat 18 for holding multiple substrates approximately horizontally at intervals in multiple stages, and a rotation mechanism for supporting and rotating the boat by way of a rotating shaft 26 penetrating through the seal cap, wherein the cover is installed in the rotating shaft, see Figure 1.

Regarding claim 8: The substrate processing apparatus according to claim 1, wherein the first gas is ammonia, the second gas is dichlorosilane, and a silicon nitride film is formed on the substrate by the thermal CVD method in the processing, the invention is held to an apparatus, the supplies of Fujita et al are inherently capable of supplying the gases listed in the claim as what specific gas is supplied does not structurally limit the prior art.

Regarding claim 18: A semiconductor device manufacturing method comprising the steps of: loading a substrate into a reaction furnace; sealing the reaction furnace hermetically with a seal cap; processing the substrate by supplying a first gas into a small chamber formed by the seal cap and a cover installed separately from the seal cap so as to cover at least a section of the surface of the seal cap facing the inner side of the reaction furnace, along with making the first gas flow into the reaction furnace from a flow outlet provided in the small chamber, and supplying a second gas into the reaction furnace from a second feed opening provided further downstream than the flow outlet; and unloading the substrate from the reaction furnace, see Figure 1 of Fujita et al and the entirety of the prior art.

5. Claims 1-8 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto (US 6,187,102)

The prior art of Yamamoto teaches a thermal treatment apparatus. The apparatus features seal cap (lid member 24) and a cover (the base of the insulating cylinder 25) that form a small chamber as illustrated in Fig. 1. Feed lined 29 and 5 correspond to the feed openings wherein each comprises a recited flow outlet. It is noted that the inert gas (nitrogen) supplies line 29 and the treatment fluid line 5, however, and apparatus it was it is and not what it does such that the type of gas supplied does not further limit the structure of Yamamoto.

Yamamoto fails to teach the cover covers the approximately the entire surface of the seal cap. The size of the seal cap and cover are well within the knowledge and skill of one within the ordinary skill in the art of designing reaction furnaces to ensure that the furnace is seal optimally from the reaction contaminants and the atmosphere. Without a showing of criticality, the

examiner holds the position that the design of the size of the cover relative to the seal cap is a matter of design and optimization that would be determined without undue experimentation. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide the cover of Yamamoto to cover the approximately the entire surface of the seal cap to ensure that the furnace is air-tight/hermetically sealed.

Regarding claim 2: The substrate processing apparatus according to claim 1, wherein the small chamber is formed by the seal cap and the cover and the inner wall surface of the reaction furnace; and the flow outlet is formed by a clearance between the cover and the inner wall surface of the reaction furnace see Figures.

Regarding claim 3: The substrate processing apparatus according to claim 2, wherein the reaction furnace includes a process tube, and a furnace opening flange for supporting the process tube; and the small chamber is formed by the seal cap and the cover and the inner wall surface of the furnace opening flange; and the flow outlet is formed by a clearance between the inner wall surface of the furnace opening flange and the cover, see Figures and flange 7a, 7b, and 8.

Regarding claim 4: The substrate processing apparatus according to claim 3, wherein the furnace opening flange includes an inlet flange for supporting the process tube, and a base flange for supporting the inlet flange; and the small chamber is formed by the inner wall surface of the base flange and the cover and the seal cap; and the flow outlet is formed by a clearance between the inner wall surface of the base flange and the cover, see Figures and flange 7a, 7b, and 8.

Regarding claim 5: The substrate processing apparatus according to claim 4, wherein the feed opening for supplying the first gas is provided in the base flange; and the feed opening for supplying the second gas is provided in the inlet flange, see Figures and flange 7a, 7b, and 8.

Regarding claim 6: The substrate processing apparatus according to claim 1, wherein the cover is formed by a plate-shaped member, see Figure 1.

Regarding claim 7: The substrate processing apparatus according to claim 1, comprising a boat 23 for holding multiple substrates approximately horizontally at intervals in multiple stages, and a rotation mechanism for supporting and rotating the boat by way of a rotating shaft penetrating through the seal cap, wherein the cover is installed in the rotating shaft, see Figures.

Regarding claim 8: The substrate processing apparatus according to claim 1, wherein the first gas is ammonia, the second gas is dichlorosilane, and a silicon nitride film is formed on the substrate by the thermal CVD method in the processing, the invention is held to an apparatus, the supplies of Yamamoto is inherently capable of supplying the gases listed in the claim as what specific gas is supplied does not structurally limit the prior art.

Regarding claim 18: A semiconductor device manufacturing method comprising the steps of: loading a substrate into a reaction furnace; sealing the reaction furnace hermetically with a seal cap; processing the substrate by supplying a first gas into a small chamber formed by the seal cap and a cover installed separately from the seal cap so as to cover at least a section of the surface of the seal cap facing the inner side of the reaction furnace, along with making the first gas flow into the reaction furnace from a flow outlet provided in the small chamber, and supplying a second gas into the reaction furnace from a second feed opening provided further downstream



than the flow outlet; and unloading the substrate from the reaction furnace, see Figures of Yamamoto and the entirety of the prior art.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R. MacArthur whose telephone number is 571-272-1438. The examiner can normally be reached on M-Th during the hours of 8 a.m. and 4:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

March 29, 2009

/Sylvia R MacArthur/  
Primary Examiner, Art Unit 1792